

ROUND 3

TOSS-UP

1) PHYSICS *Multiple Choice* Which of the following is measured in Hertz?

- W) speed
- X) frequency
- Y) wavelength
- Z) amplitude

ANSWER: X) FREQUENCY

BONUS

1) PHYSICS *Short Answer* For projectiles fired at identical speeds but various angles from the ground, neglecting air resistance and the curvature of the Earth, at what angle will the maximum horizontal distance be attained?

ANSWER: 45 DEGREES (ACCEPT: $\pi/4$)

TOSS-UP

2) BIOLOGY *Multiple Choice* Commensalism is when:

- W) both species benefit
- X) neither species affects the other
- Y) one species benefits while the other is unaffected
- Z) both species are harmed

ANSWER: Y) ONE SPECIES BENEFITS WHILE THE OTHER IS UNAFFECTED

BONUS

2) BIOLOGY *Short Answer* What does the first word designate in the binomial nomenclature system?

ANSWER: GENUS

TOSS-UP

3) CHEMISTRY *Multiple Choice* Which of the following is NOT true of helium?

- W) deep sea divers breath a mixture of helium and oxygen
- X) breathing helium causes a temporary change in the pitch and quality of one's voice
- Y) helium gas is commonly used by dentists as a mild anesthetic
- Z) a mixture of helium and neon gas produced the first gas laser

ANSWER: Y) HELIUM GAS IS COMMONLY USED BY DENTISTS AS A MILD ANESTHETIC

BONUS

3) CHEMISTRY *Short Answer* It is estimated that each person in the United States consumes an average of 100 pounds of sucrose each year. Which two simple sugars are linked to make a sucrose molecule?

ANSWER: GLUCOSE AND FRUCTOSE (ACCEPT: D-GLUCOSE AND D-FRUCTOSE OR ALDOHEXOSE AND KETOHEXOSE)

TOSS-UP

4) ASTRONOMY *Multiple Choice* The apparent speed of the Sun along the ecliptic:

- W) is constant
- X) varies during the solar year
- Y) varies only during winter
- Z) varies only during summer

ANSWER: X) VARIES DURING THE SOLAR YEAR

BONUS

4) ASTRONOMY *Short Answer* What are the scientific names for the two regions of a sunspot?

ANSWER: UMBRA AND PENUMBRA

TOSS-UP

5) MATH *Multiple Choice* What would a graph of the equation $f(x) = |x|$ (read as: f of x equals the absolute value of x) look like?

- W) it would be shaped like the letter V
- X) it would have a sigmoid shape
- Y) it would have a parabolic shape
- Z) it would have a sine wave shape

ANSWER: W) IT WOULD BE SHAPED LIKE THE LETTER V

BONUS

5) MATH *Short Answer* Six factorial equals what number?

ANSWER: 720

TOSS-UP

6) EARTH SCIENCE *Multiple Choice* In determining the distance of an earthquake to its epicenter, which of the following is the most useful tool:

- W) intensity of P-wave
- X) intensity of S-wave
- Y) difference in intensity between P and S-waves
- Z) time interval between P-wave and S-wave arrival

ANSWER: Z) TIME INTERVAL BETWEEN P-WAVE AND S-WAVE ARRIVAL

BONUS

6) EARTH SCIENCE *Short Answer* A solid compound whose internal structural pattern is expressed as plane faces that can be seen with the unaided eye is generally known as a:

ANSWER: CRYSTAL (ACCEPT: CRYSTALLINE)

TOSS-UP

7) GENERAL SCIENCE *Multiple Choice* Which of the following correctly describes STP:

- W) 4°C at 1 Atmosphere
- X) 0°C at 0 Atmosphere
- Y) 23°C at 1 Atmosphere
- Z) 0°C at 1 Atmosphere

ANSWER: Z) 0°C AT 1 ATMOSPHERE

BONUS

7) GENERAL SCIENCE *Short Answer* What are the 7 colors that Newton used to describe the visible light spectrum:

ANSWER: RED, ORANGE, YELLOW, GREEN, BLUE, INDIGO, AND VIOLET (need not be in order)

TOSS-UP

8) GENERAL SCIENCE *Multiple Choice* A typical CD-ROM can hold a maximum of about how much data?

- W) 650 MB
- X) 1.5 GB
- Y) 2.5 GB
- Z) 15 GB

ANSWER: W) 650 MB

BONUS

8) GENERAL SCIENCE *Short Answer* What does the acronym CPU stand for?

ANSWER: CENTRAL PROCESSING UNIT

TOSS-UP

9) PHYSICS *Multiple Choice* Which of the following colors of light has the greatest angle of refraction in normal glass:

- W) yellow
- X) green
- Y) violet
- Z) red

ANSWER: Y) VIOLET

BONUS

9) PHYSICS *Short Answer* What is the term for the speed at which an object will overcome the gravitational attraction of the Earth?

ANSWER: ESCAPE VELOCITY

TOSS-UP

10) BIOLOGY *Short Answer* What kingdom of organisms does a professional Mycologist (pronounced: my-KOL'-o-jist) study?

ANSWER: FUNGI

BONUS

10) BIOLOGY *Multiple Choice* Which of the following responses do auxins NOT typically produce in plants:

- W) cell elongation
- X) fruit maturation
- Y) xylem differentiation
- Z) pollen tube growth

ANSWER: Z) POLLEN TUBE GROWTH

TOSS-UP

11) CHEMISTRY *Short Answer* What molecule is characteristically prevalent in sour milk and tired muscles?

ANSWER: LACTIC ACID

BONUS

11) CHEMISTRY *Multiple Choice* Which of the following has the same electron configuration as neon:

W) Ar

X) F

Y) Cl (pronounced C, L, minus)

Z) Na⁺ (pronounced N, A, plus)

ANSWER: Z) Na⁺

TOSS-UP

12) ASTRONOMY *Short Answer* This powerful telescope weighs about 11 tons, has a primary mirror 7.9 feet in diameter, and orbits about 380 miles above the earth:

ANSWER: THE HUBBLE TELESCOPE

BONUS

12) ASTRONOMY *Short Answer* In the Doppler effect, what is the correct term for the change in the color of light when an object that is emitting light is moving toward the observer?

ANSWER: BLUE-SHIFT

TOSS-UP

13) MATH *Short Answer* The converse of this theorem is: if the sum of the squares of two sides of a triangle equal the square of the third side then the triangle is a right triangle. What is the name of the theorem?

ANSWER: PYTHAGOREAN THEOREM

BONUS

13) MATH *Multiple Choice* Assuming a year in a dog's life is equivalent to 7 years of a human's life, what is 1 hour of a dog's life approximately equivalent to in a human's life?

- W) 3 ½ hours
- X) 7 hours
- Y) 5 hours
- Z) 4 ½ days

ANSWER: X) 7 HOURS

TOSS-UP

14) EARTH SCIENCE *Multiple Choice* Which of the following is primarily involved in the movement of a glacier:

- W) running water
- X) ambient temperature
- Y) topology
- Z) gravity

ANSWER: Z) GRAVITY

BONUS

14) EARTH SCIENCE *Short Answer* What is the name for the margin where two plates in the lithosphere slide past each other?

ANSWER: TRANSFORM FAULT MARGINS

TOSS-UP

15) GENERAL SCIENCE *Short Answer* Iron pyrite is more popularly called:

ANSWER: FOOL'S GOLD

BONUS

15) GENERAL SCIENCE *Short Answer* In 1546, Frascatorius, by studying epidemics of plague and syphilis, compiled an impressive body of evidence to show disease was transmitted from person to person and is therefore considered to have founded what branch of science?

ANSWER: EPIDEMIOLOGY

TOSS-UP

16) GENERAL SCIENCE *Multiple Choice* TCP/IP is an example of:

- W) a computing environment
- X) a database model
- Y) a 4th generation computer language
- Z) a networking protocol

ANSWER: Z) A NETWORKING PROTOCOL

BONUS

16) GENERAL SCIENCE *Short Answer* What does the acronym LCD stand for?

ANSWER: LIQUID CRYSTAL DISPLAY

TOSS-UP

17) PHYSICS *Multiple Choice* What large machine, which came on line in the summer of 2000 at the Department of Energy's Brookhaven National Lab, is the world's highest energy ion collider:

- W) Advanced Photon Source
- X) CERN supercollider
- Y) Relativistic Heavy Ion Collider
- Z) Phoenix

ANSWER: Y) RELATIVISTIC HEAVY ION COLLIDER

BONUS

17) PHYSICS *Short Answer* According to the standard model of particle physics, what is the name for the three leptons that have no electric charge and little if any mass?

ANSWER: NEUTRINO (ACCEPT: ELECTRON NEUTRINO, TAU NEUTRINO, AND MUON NUTRINO)

TOSS-UP

18) BIOLOGY *Multiple Choice* Which of the following is NOT true about toxic shock syndrome:

- W) it is not known to occur in males
- X) it is caused by a bacteria
- Y) up to 15% of healthy women harbor the causative germ in their vaginal flora
- Z) it is associated with infrequent changes of super absorbent tampons

ANSWER: W) IT IS NOT KNOWN TO OCCUR IN MALES

BONUS

18) BIOLOGY *Short Answer* What kind of microscopy does the following describe: Samples are treated with an electron-dense material and then cut into thin layers. While inside the microscope's column, electrons that are passed through the sample and differentially scattered to show a silhouetted image on a phosphorescent screen:

ANSWER: TRANSMISSION ELECTRON MICROSCOPY (ACCEPT: TEM)
(DO NOT ACCEPT: SCANNING ELECTRON MICROSCOPY OR SEM)

TOSS-UP

19) CHEMISTRY *Multiple Choice* Which of the following is true of bases:

- W) they give rise to hydrogen ions when dissolved in water
- X) they are substances that accept or react with hydrogen ions
- Y) they always contain the hydroxide ion in it's structure
- Z) they have a pH below 7

ANSWER: X) THEY ARE SUBSTANCES THAT ACCEPT OR REACT WITH HYDROGEN IONS

BONUS

19) CHEMISTRY *Short Answer* Myoglobin binds oxygen in what tissue in the human body?

ANSWER: MUSCLE

TOSS-UP

20) ASTRONOMY *Multiple Choice* In the Australian winter night sky, which of the following is true regarding the constellation Orion:

- W) it is seen in the western sky
- X) it is seen in the southern sky
- Y) it is seen in the northern sky
- Z) it can never be seen

ANSWER: Y) IT IS SEEN IN THE NORTHERN SKY

BONUS

20) ASTRONOMY *Short Answer* The Kappa Cygnids and the Northern Delta Aquarids are names for what phenomena?

ANSWER: METEOR SHOWERS

TOSS-UP

21) EARTH SCIENCE *Short Answer* As glaciers erode the surface over which they move, sets of parallel linear grooves are sometime worn into the rock surface. These grooves are called:

ANSWER: STRIATIONS

BONUS

21) EARTH SCIENCE *Multiple Choice* Of the following, which are clouds formed at the highest altitude:

- W) altocumulus
- X) altostratus
- Y) cirrocumulus
- Z) nimbostratus

ANSWER: Y) CIRROCUMULUS

(Solution: W=2-6km; X=6-8km; Y=6-15km; Z=2-6km)

TOSS-UP

22) GENERAL SCIENCE *Multiple Choice* Which of the following fluids at room temperature will cool a ½ inch thick piece of hot steel the fastest:

- W) pure water
- X) 5% salt water
- Y) 25% salt water
- Z) motor oil

ANSWER: W) PURE WATER

BONUS

22) GENERAL SCIENCE *Short Answer* What two Federal scientific agencies are responsible for the general administration of the human genome project?

ANSWER: DEPARTMENT OF ENERGY AND NATIONAL INSTITUTES OF HEALTH
(ACCEPT: DOE and NIH)

TOSS-UP

23) PHYSICS *Multiple Choice* Which general theory of science allows scientists to quantitatively understand the behavior of molecules, solids, liquids, and both conductors and semiconductors:

- W) General Theory of Relativity
- X) Gravitational Theory
- Y) Special Theory of Relativity
- Z) Quantum Theory

ANSWER: Z) QUANTUM THEORY

BONUS

23) PHYSICS *Short Answer* This perceived force, that seems to want to throw a person off a merry-go-round, is often regarded by physicists as a fictitious force:

ANSWER: CENTRIFUGAL FORCE

TOSS-UP

24) BIOLOGY *Multiple Choice* What is water loss through the stomata of a plant called:

- W) condensation
- X) liquidation
- Y) transpiration
- Z) exchange

ANSWER: Y) TRANSPIRATION

BONUS

24) BIOLOGY *Short Answer* Which germ layer in mammals is predominantly responsible for forming the nervous system?

ANSWER: ECTODERM

TOSS-UP

25) CHEMISTRY *Multiple Choice* The wavelength of yellow light is 600 nanometers. What is the wavelength in centimeters:

W) 6.0×10^{-9} (read as: 6.0 times 10 to the minus 9)

X) 6.0×10^{-7}

Y) 6.0×10^{-5}

Z) 6.0×10^{-2}

ANSWER: Y) 6.0×10^{-5}

BONUS

25) CHEMISTRY *Short Answer* What is the term for the pH at which an amino acid or protein becomes electrically neutral?

ANSWER: ISOELECTRIC POINT